

CS 4173/5173 - 995 Computer Security

Fall 2024 Syllabus

1. Instructor

Dr. Shangqing Zhao (shangqing@ou.edu)

Class meetings: Online

Office hour: Online or Appointment by email

Discord Server: <https://discord.gg/DWNGVDa6Cm>

2. Teaching Assistant

Yan He (heyan@ou.edu)

3. Prerequisites

Course: CS 3113 Introduction to Operating Systems

Background: Basic probability knowledge and basic programming skills are essential to understand the technical content in this course. Students do not need to have the prior knowledge of cyber security. The knowledge of computer and network systems is a bonus but not an essence. The technical/mathematical content in the course is self-contained.

4. Course Description

This course provides an overall view and essential knowledge of computer security, and it is not heavily theory-oriented, but application-oriented with appropriate mathematical content. It is self-contained and covers basic elements in communication, network and data security, including information-theoretic security, cryptographic primitives, secret sharing, basic security attacks and countermeasures.

Note: The content and syllabus are subject to adjustment during the semester. Part of the materials used in this course will be based on existing lectures from other universities. No student may earn credit for both CS 4173 and CS 5173.

5. Course Objectives

This course provides essential knowledge for students to understand concepts and mechanisms in computer and network security. It not only helps you understand and solve real-life security problems, but also helps you improve your own practices when handling your personal information or data in computer and network systems.

6. Course Topics

1. Security goals and metrics
2. Symmetric and asymmetric ciphers
3. Secure architectures and protocols
4. Common attacks and countermeasures

7. Student Learning Outcomes

By the end of this course, students will be able to:

1. describe the basic security objectives associated with a particular design/application
2. use security standards to analyze a system design
3. apply cryptographic primitives to design a secure system
4. list potential vulnerabilities of a given system that may be potentially exploited
5. identify key factors associated with building a cost-efficiency security design based on cryptographic ciphers

8. Recommended Textbook

Charlie Kaufman, Radia Perlman, and Mike Speciner, *Network Security: Private Communication in a Public World, 2nd Edition*, Prentice Hall, 2002, ISBN: 0-13-0460192.

Wenliang Du. *Computer & Internet Security: A Hands-on, 2nd Edition*, 2019.

Note: The lecture slides/notes will be posted on the course webpage after each lecture.

9. Course Schedule

(These will be adjusted based on the actual progress in a semester.)

#	Topics
1	Course Overview and Introduction
2	Security Objectives and Requirements
3	Cryptography and Security Metrics
4	Symmetric Cryptography
5	Hash Functions
6	Basic Number Theory and Public Cryptography
7	Digital Certificates and PKI
8	Authentication Protocol Design
9	Homomorphic Encryption and Honey Encryption
10	Blockchain and Proof of Work
11	Secure Data Applications
12	Anonymous Network and Online Privacy

10. Grading Scale

Grading Scale (%)	
85 – 100	A
75 – 84	B
65 – 74	C
55 – 64	D
0 – 54	F

11. Grade Categories and Weights

	CS 4173	CS5173
Attendance	0%	0%
Assignments	50%	50%

Midterm Exam	15%	15%
Final Exam	25%	20%
Project	10%	15%

12. Policies on Late Assignments

For each day an assignment is late - up to a maximum of 3 days, the grade is reduced 15%. For example, if you submit a 90%-correct assignment 2 days late, your overall assignment score will be 60%. There will be extra accommodation if you have been impacted by COVID-19, please let the instructor know.

13. Policies on Absences and Scheduling Makeup Work

There will be no makeups for homework assignments. Make-up exams will not normally be permitted. Exceptions will be made if a student presents a police report or a doctor's note that shows some emergency.

14. Student Evaluations

The College of Engineering utilizes student ratings as one of the bases for evaluating the teaching effectiveness of each of its faculty members. The results of these forms are important data used in the process of awarding tenure, making promotions, and giving salary increases. In addition, the faculty uses these forms to improve their own teaching effectiveness. The original request for the use of these forms came from students, and it is students who eventually benefit most from their use. Please take this task seriously and respond as honestly and precisely as possible, both to the machine-scored items and to the open-ended questions.

15. University Policies

This section includes the mandatory University policies.

Copyright Syllabus Statement for In-Person or Online Courses

Sessions of this course may be recorded or live-streamed. These recordings are the intellectual property of the individual faculty member and may not be shared or reproduced without the explicit, written consent of the faculty member. In addition, privacy rights of others such as students, guest lecturers, and providers of copyrighted material displayed in the recording may be of concern. Students may not share any course recordings with individuals not enrolled in the class, or upload them to any other online environment.

Academic Integrity

There is not specific language for the Academic Integrity policy to be included in the syllabus. It is good to become familiar with the policy and describe it in your own words.

[See http://integrity.ou.edu/faculty_guide.html]

Cheating is strictly prohibited at the University of Oklahoma, because it devalues the degree you are working hard to get. As a member of the OU community it is your responsibility to protect your educational investment by knowing and following the rules. For specific definitions on what constitutes cheating, review the Student's Guide to Academic Integrity at http://integrity.ou.edu/students_guide.html

To be successful in this class, all work on exams and quizzes must be yours and yours alone. You may not receive outside help. On examinations and quizzes you will never be permitted to use your notes,

textbooks, calculators, or any other study aids. Should you see someone else engaging in this behavior, I encourage you to report it to myself or directly to the Office of Academic Integrity Programs. That student is devaluing not only their degree, but yours, too. Be aware that it is my professional obligation to report academic misconduct, which I will not hesitate to do. Sanctions for academic misconduct can include expulsion from the University and an F in this course, so don't cheat. It's simply not worth it.

Religious Observance

It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty.

[See Faculty Handbook 3.15.2]

Reasonable Accommodation Policy

There is not specific language for the Reasonable Accommodation policy to be included in the syllabus. It is good to become familiar with the policy and describe it in your own words. Including the link to Accessibility and Disability Resources Center is encouraged: <http://www.ou.edu/drc/home.html>. [See Faculty Handbook 5.4]

Students requiring academic accommodation should contact the Accessibility and Disability Resource Center for assistance at (405) 325-3852 or TDD: (405) 325-4173. For more information, please visit <http://www.ou.edu/drc/home.html>. Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

Title IX Resources and Reporting Requirement

For any concerns regarding gender-based discrimination, sexual harassment, sexual assault, dating/domestic violence, or stalking, the University offers a variety of resources. To learn more or to report an incident, please contact the Sexual Misconduct Office at 405/325-2215 (8 to 5, M-F) or smo@ou.edu. Incidents can also be reported confidentially to OU Advocates at 405/615-0013 (phones are answered 24 hours a day, 7 days a week). Also, please be advised that a professor/GA/TA is required to report instances of sexual harassment, sexual assault, or discrimination to the Sexual Misconduct Office. Inquiries regarding non-discrimination policies can be directed to University Equal Opportunity Officer and Title IX Coordinator at 405/325-3546 or smo@ou.edu. For more information, visit <http://www.ou.edu/eoo.html>.

Adjustments for Pregnancy/Childbirth Related Issues

Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact your professor or the Disability Resource Center at 405/325-3852 as soon as possible. Also, see <http://www.ou.edu/eoo/faqs/pregnancy-faqs.html> for answers to commonly asked questions.

Final Exam Preparation Period

Pre-finals week will be defined as the seven calendar days before the first day of finals. Faculty may cover new course material throughout this week. For specific provisions of the policy please refer to OU's Final Exam Preparation Period policy (<https://apps.hr.ou.edu/FacultyHandbook#4.10>).

Emergency Protocol

During an emergency, there are official university [procedures](#) that will maximize your safety.

Severe Weather: If you receive an OU Alert to seek refuge or hear a tornado siren that signals severe weather *1. LOOK* for severe weather refuge location maps located inside most OU buildings near the

entrances 2. *SEEK* refuge inside a building. Do not leave one building to seek shelter in another building that you deem safer. If outside, get into the nearest building. 3. *GO* to the building's severe weather refuge location. If you do not know where that is, go to the lowest level possible and seek refuge in an innermost room. Avoid outside doors and windows. 4. GET IN, GET DOWN, COVER UP. 5. *WAIT* for official notice to resume normal activities.

[Link to Severe Weather Refuge Areas](#) , [Severe Weather Preparedness - Video](#)

Armed Subject/Campus Intruder: If you receive an OU Alert to shelter-in-place due to an active shooter or armed intruder situation or you hear what you perceive to be gunshots:

1. *GET OUT*: If you believe you can get out of the area WITHOUT encountering the armed individual, move quickly towards the nearest building exit, move away from the building, and call 911. 2. *HIDE OUT*: If you cannot flee, move to an area that can be locked or barricaded, turn off lights, silence devices, spread out, and formulate a plan of attack if the shooter enters the room. 3. *TAKE OUT*: As a last resort fight to defend yourself.

For more information, visit <http://www.ou.edu/emergencypreparedness.html>

[Shots Fired on Campus Procedure - Video](#)

Fire Alarm/General Emergency: If you receive an OU Alert that there is danger inside or near the building, or the fire alarm inside the building activates: 1. *LEAVE* the building. Do not use the elevators. 2. *KNOW* at least two building exits 3. *ASSIST* those that may need help 4. *PROCEED* to the emergency assembly area 5 *ONCE safely outside, NOTIFY first responders of anyone that may still be inside building due to mobility issues.* 6. *WAIT* for official notice before attempting to re-enter the building.

[OU Fire Safety on Campus](#)

Mental Health Support Services

If you are experiencing any mental health issues that are impacting your academic performance, counseling is available at the University Counseling Center (UCC). The Center is located on the second floor of the Goddard Health Center, at 620 Elm Rm. 201, Norman, OK 73019. To schedule an appointment call (405) 325-2911.

For more information please visit <http://www.ou.edu/ucc>.

**Every part of this syllabus is subject to adjustment as the semester progresses. If you are dissatisfied with the course policies, grading, and assignments, please contact the instructor. Reasonable requests for modifications may be accommodated at the instructor's discretion.*